Standards:
HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

Introduction:
Have you ever needed an easier and cooler way to pick up paper clips? With just a few simple household supplies, you can create a very powerful electromagnet of your own. By wrapping copper wire around a nail, you can create an electrical field which then in turn produces a magnetic field (right hand rule). When you complete the circuit, electrons flow through the copper wire and produce a magnetic field that allows you to pick up iron objects such as paperclips with the tip of the nail.

Materials:
- 9-V battery
- About 3 feet of thin coated copper wire

This material is based upon work supported by the CSUB Revitalizing Science University Program (REVS-UP) funded by Chevron Corporation. Opinions or points of view expressed in this document are those of the authors and do not necessarily reflect the official position of the Corporation or CSUB.
• A large iron nail
• Some paper clips
• Alligator clips
• Light switch

Safety:
• Always have an adult with you to help you during your experiment.
• Always wear eye protection and gloves when doing chemistry experiments

Procedure:
1. Coil the wire around the nail. The more and tighter the coils the better. Make sure that some of the wire is sticking out on both ends.
2. Make sure the switch is off and then connect the alligator clips to the light switch.
3. Clip the other end of each alligator clip to each end of the nail.
4. Flip the switch on.
5. Move the nail near the paper clips. It should pick up some of them.

Data and Observations:
1. Record your observations in this space
2. How many paper clips were you able to pick up at a time?

References: